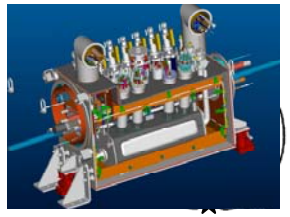
US LHC ACCELERATOR PROJECT

berkeley - brookhaven - fermilab

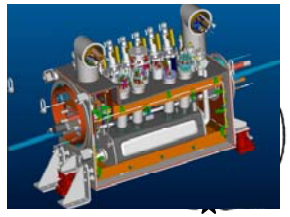


Large Hadron Collider (LHC)
Project Update

Joseph Rasson
LBNL

Presented at DOE HEP Review
Berkeley, CA
18-19 February 2004

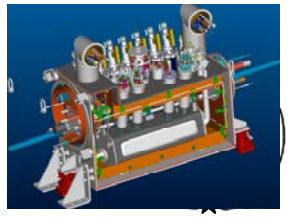
Outline



LBNL US LHC Accelerator Project

- Project Overview
- IR Absorbers (TAS and TAN)
- Cryogenic Distribution Boxes (DFBX)

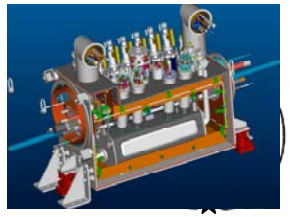
US LHC Accelerator Activities

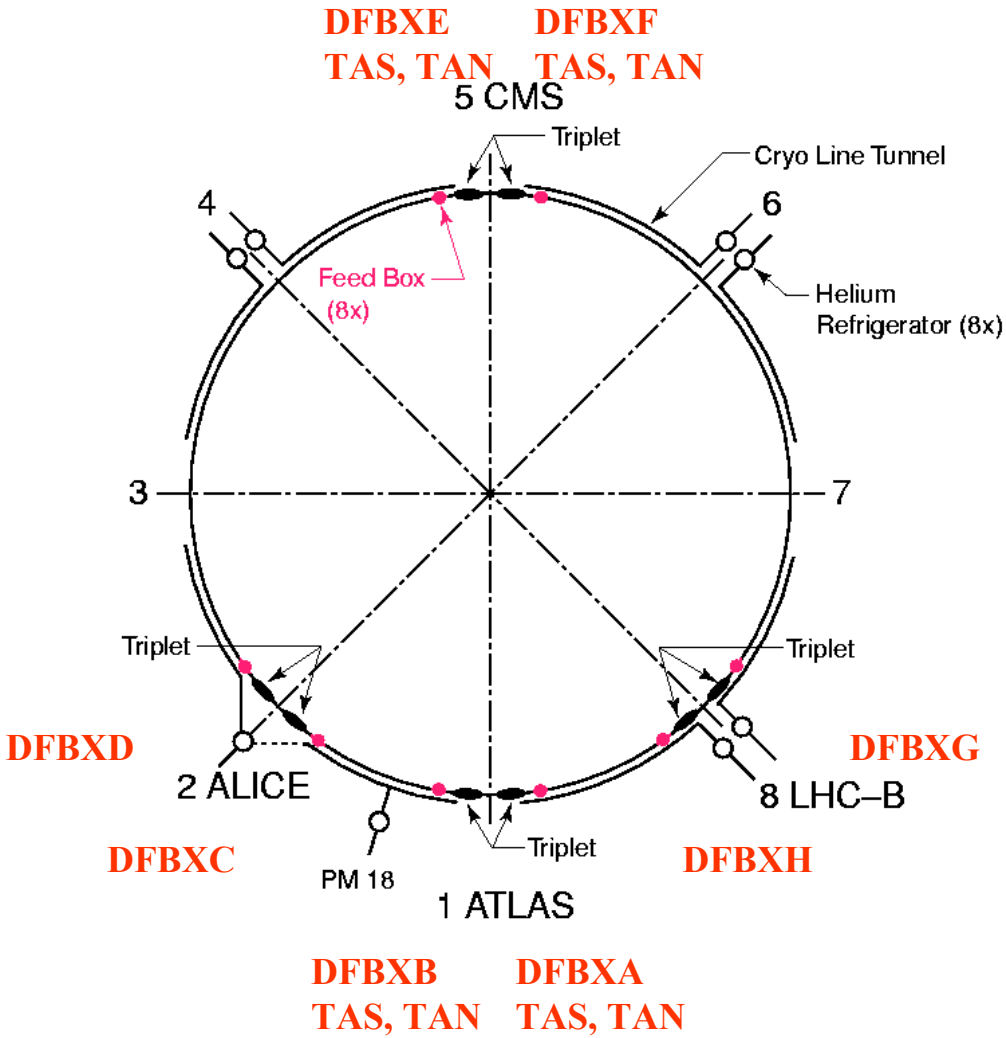


- The US LHC Accelerator Project
  - Started in FY96
  - LBNL-BNL+FNAL, FNAL lead lab
  - $110M total project budget
  - Emphasizes building hardware for LHC insertions
  - 89% complete as of Dec 2003
  - Ends in 2005 with deliverables on dock at CERN

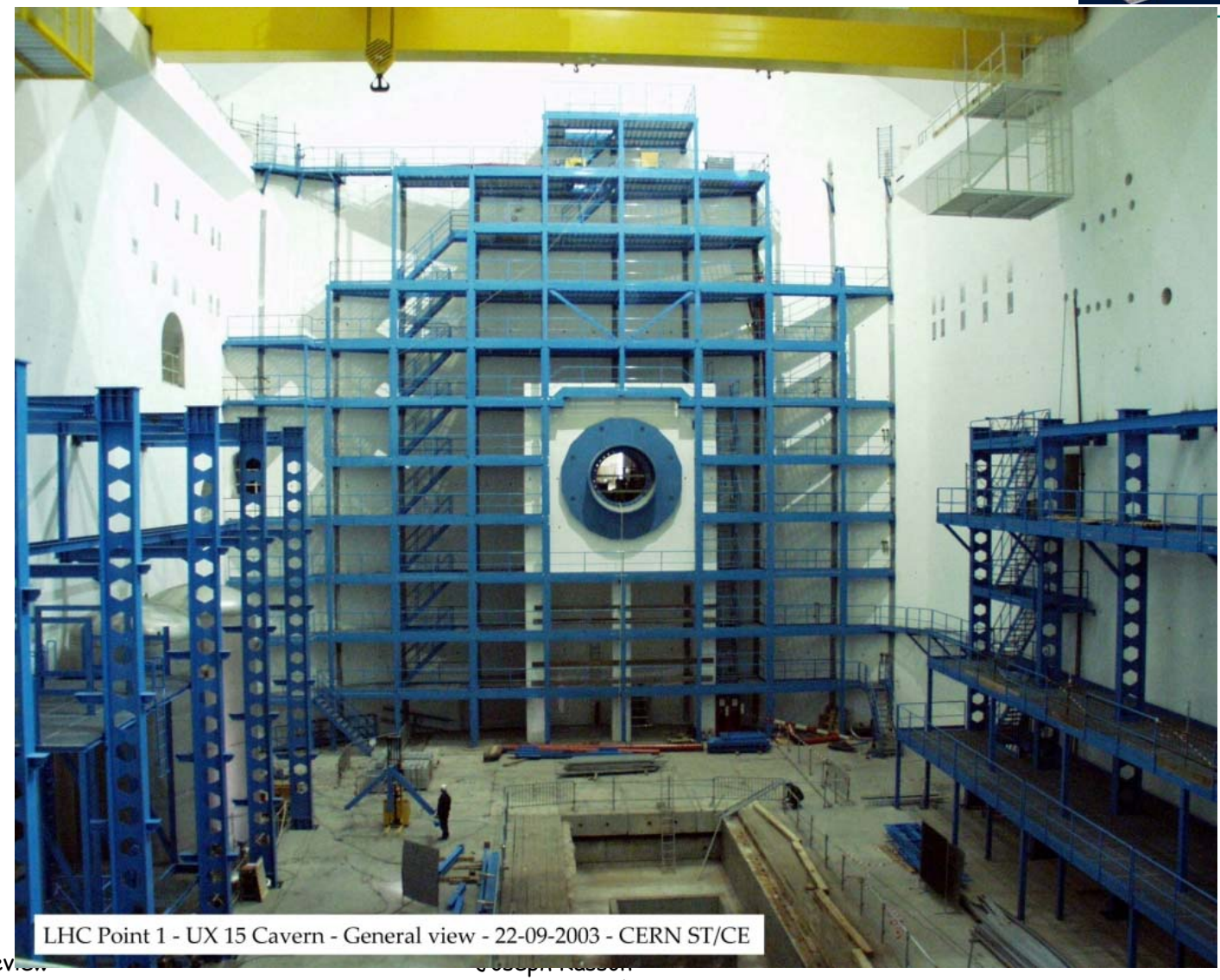
Aerial View of CERN and LHC Footprint

Location of LBL's Hardware

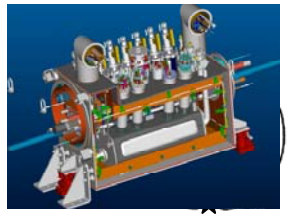




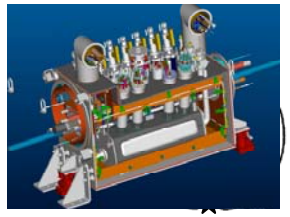
Recent Photograph of ATLAS Cavern



Magnet Installation in the LHC Beam Transfer Line TI 8

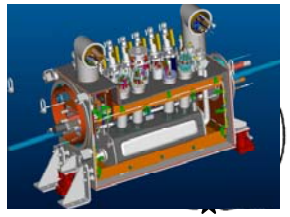


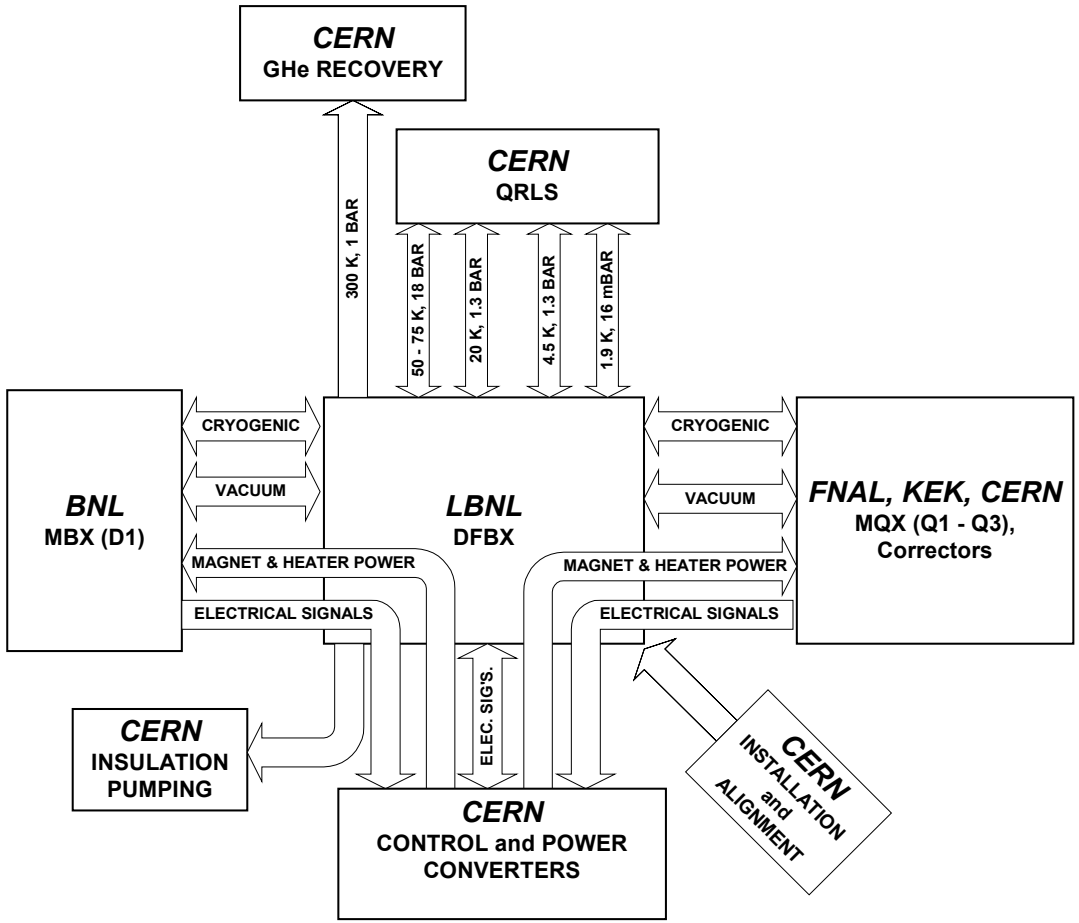
LBNL Cost Performance Summary Through Dec 2003



WBS	Description	BAC	% Complete	
1.1.1	IR Quads	1,921.9	100	Complete 2002
1.1.3	Cryo Feedboxes	8,251.2	90	
1.1.4	IR Absorbers	4,557.8	100	
1.3.2	SC Cables	936.2	100	Complete 2001
1.4.3	Accelerator Physi	626.2	100	Complete 2002
1.5.4	Project Mgmt	1,491.5	96	
	OH	264.9	91	
	GA	2,317.0	95	
Total (k$)		20,366.8	87	

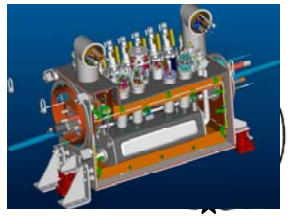
Cryogenic Dist. Boxes (DFBX) Functional Diagram

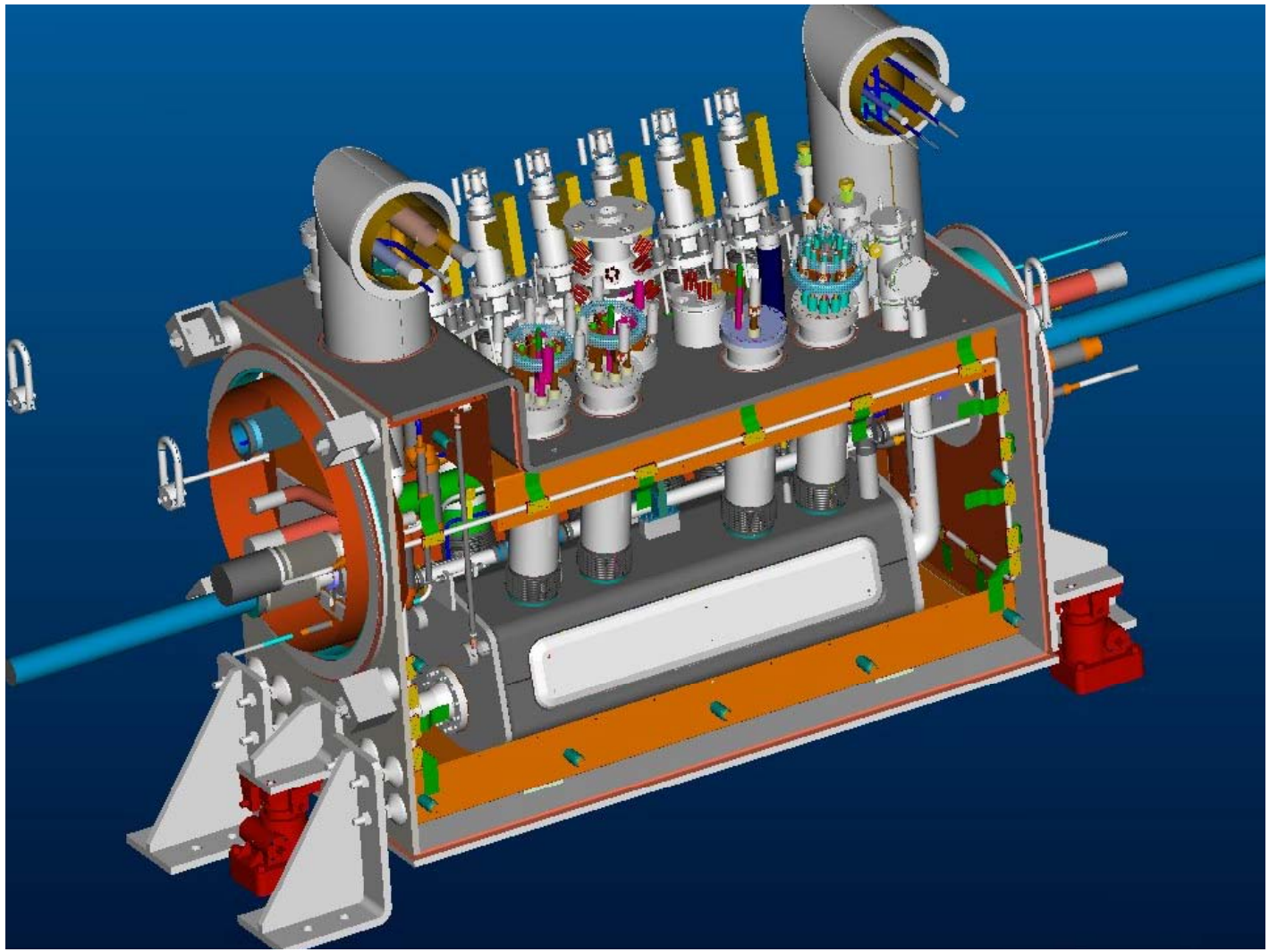




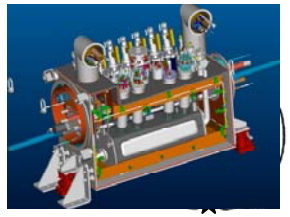
DFBX Functional Diagram (IP's 2 & 8)

CAD Model of DFBX Illustrates Complexity



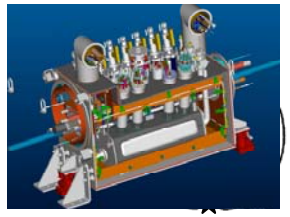


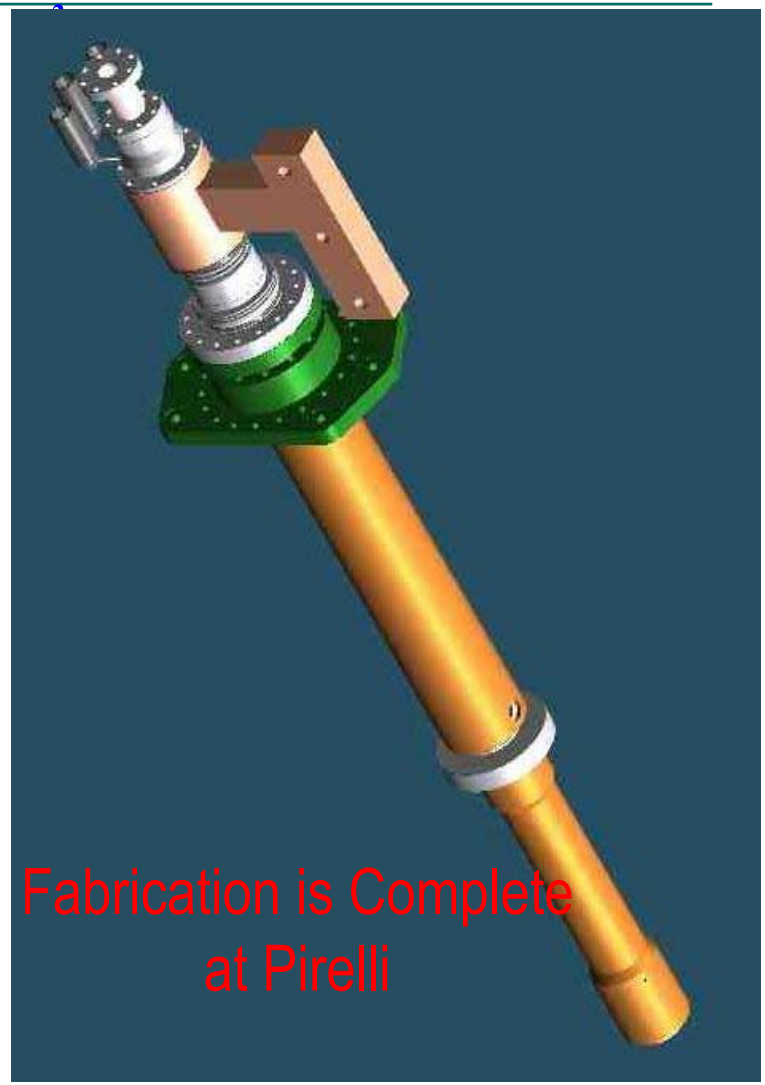
DFBX Highlights Since Last Year's Review



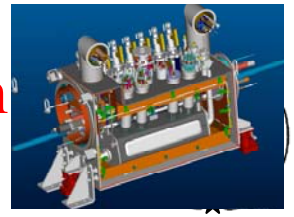
- Great progress was achieved in the last year toward completing the DFBX project
- Major fabrication, assembly and integration operations are underway at Meyer Tool and Mfg Inc.
- Fabrication of Government Furnished Material (GFM) is complete

40 Each 7,500A HTS Current Leads Fabrication and Test





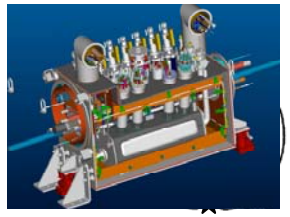
32 Each Vapor Cooled Power Leads Fabrication is Complete



- Fabrication at American Magnetics (AMI) is complete:
  - 16 ea 6-lead, 600 A assemblies
  - 8 ea 2-lead, 600 A assemblies
  - 8 ea 10-lead 120 A assemblies

All Leads are shipped to Meyer Tool for Integration

Bus Duct/Lambda Plate Fabrication at LBL is Complete

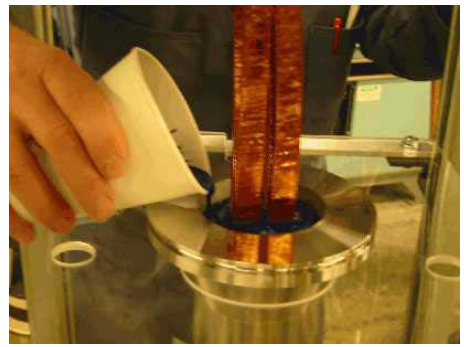


Completed

1. Insert Busses into G-10 Plug

2. 2850 MT Potting in Vacuum

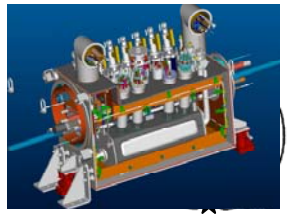
3. Seal Magnet Side with 2850 MT



4. Seal DFBX side with 2850 MT

5. Voila!

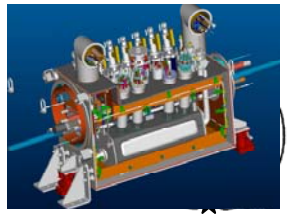
Bus Duct Fabrication Complete at LBNL



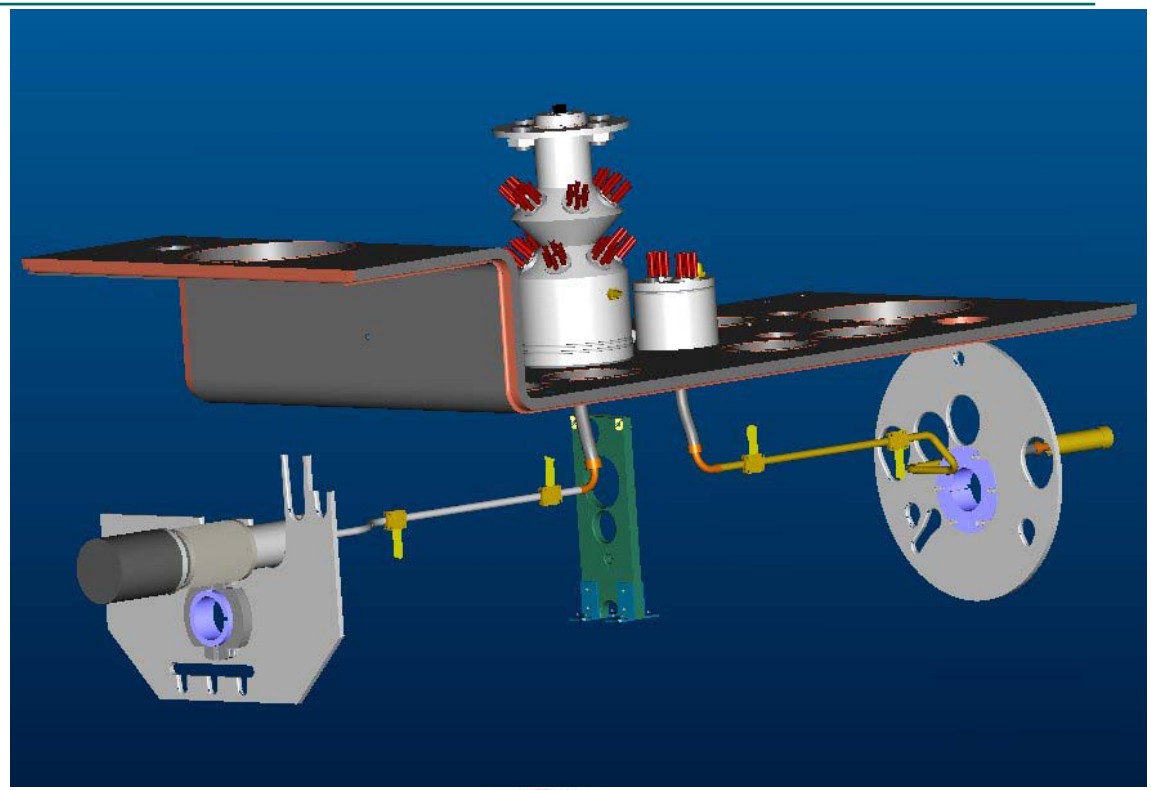
Beam Tube Fabrication at LBNL is Complete

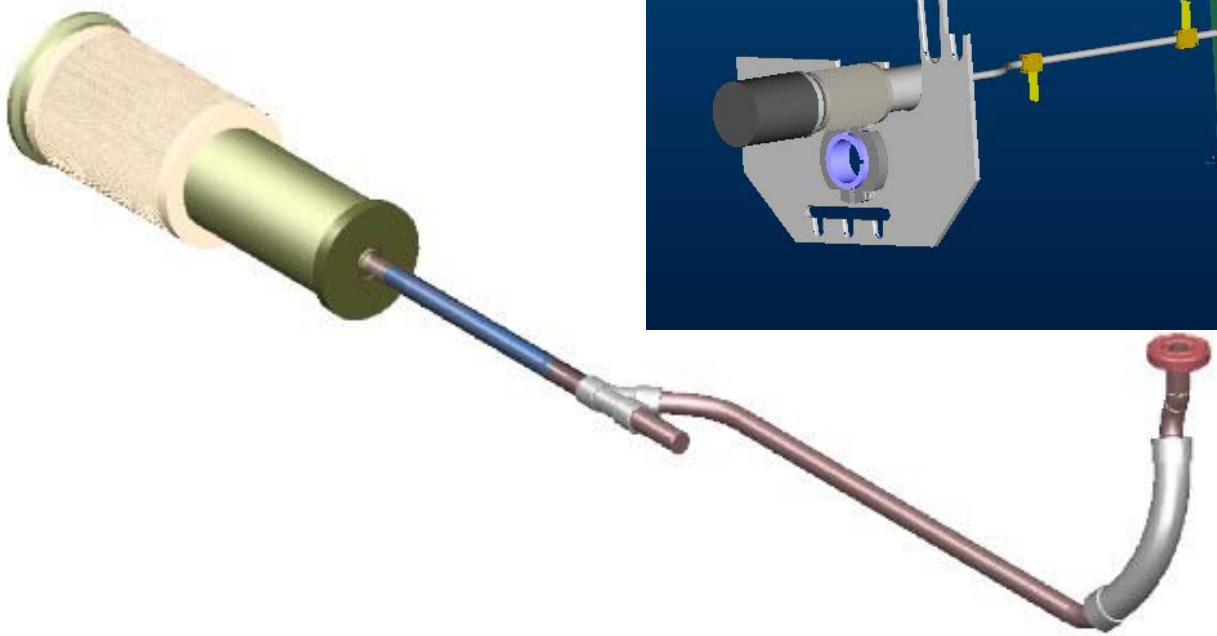
8 Beam Tubes were shipped to MTM for integration

Magnet Instrumentation Conduits Fabrication at Fermilab

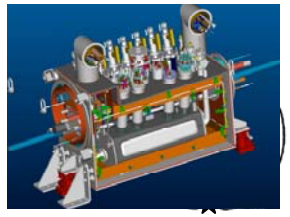


All conduits to be delivered to MTM by the End of Feb 04

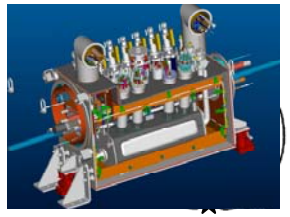




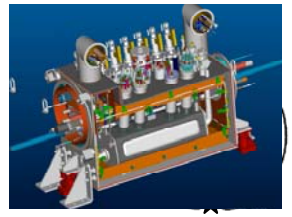
All Mechanical Components are Fabricated



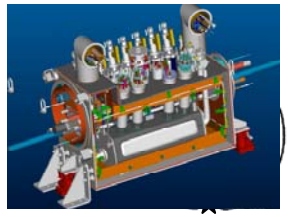
Quadrupole Diagnostic Feedthrough Assemblies



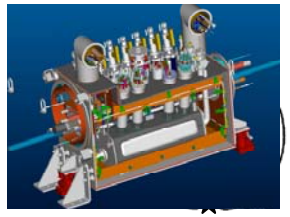
Spool Pieces are Complete

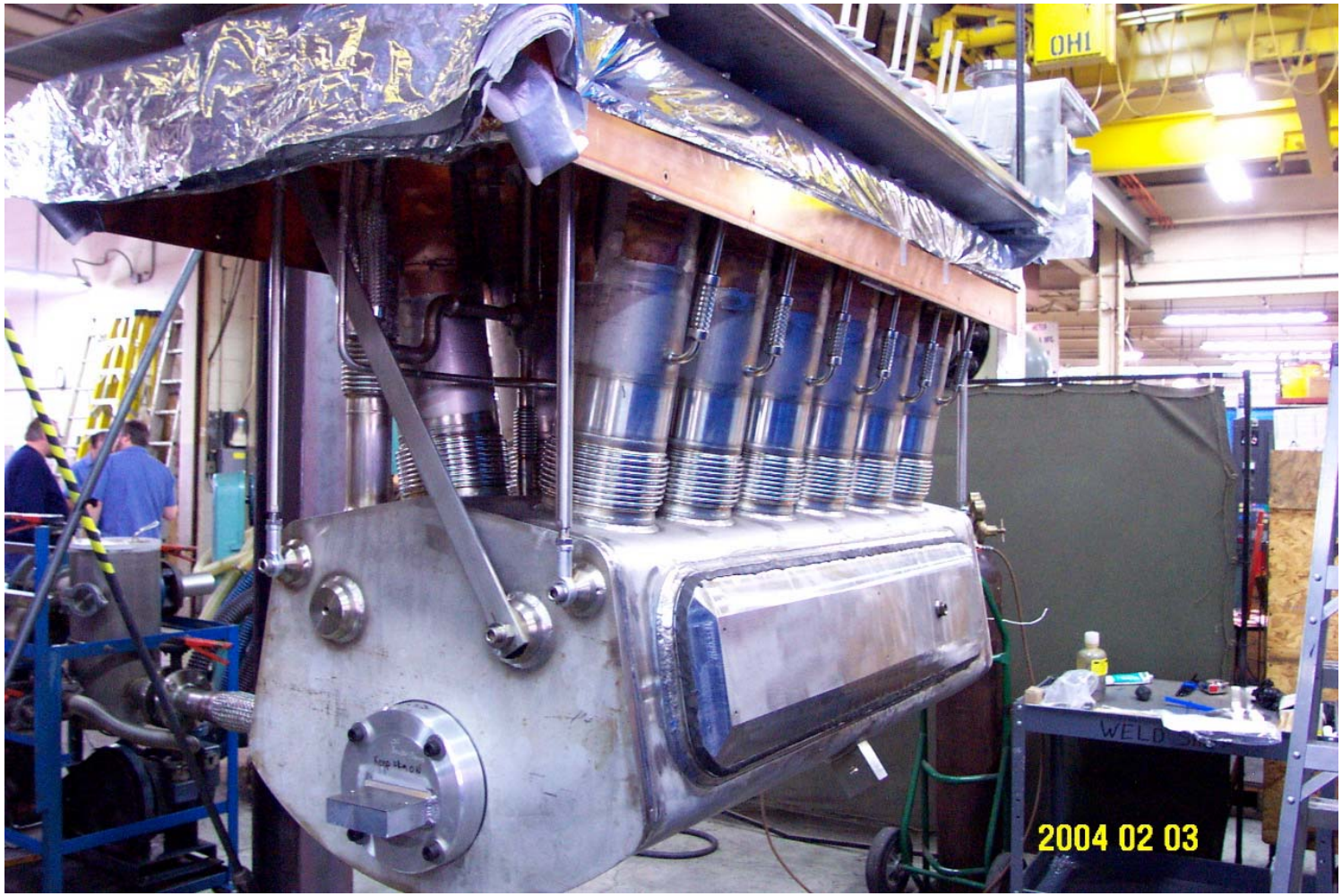


DFBX Assembly and Integration is Underway at MTM

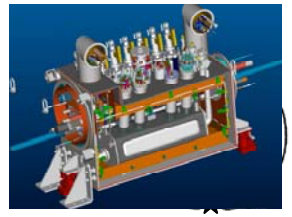


Subsystem Vacuum Leak Test

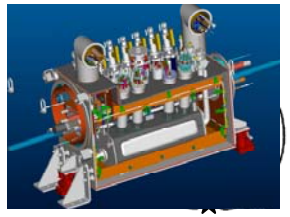




Thermal Shield Components are Complete



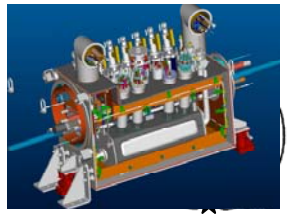
DFBX Production Schedule



- DFBX No. 1and 2 Ready to Ship — 1 Aug 2004
- DFBX Nos. 3 and 4 Ready to Ship — 15 Dec 2004
- DFBX Nos. 5 and 6 Ready to Ship — 12 Jun 2005
- DFBX Nos. 7 and 8 Ready to Ship — 1 Sep 2005

- Schedule Constraints:
  1. First DFBX needed at CERN for sector test 24 Sep 2004
  2. Last DFBX should be shipped before end of DOE's end of project milestone (30 Sep 05)

IR Absorber Overview - TAN



The TAN consists of three major assemblies;

1. Absorber box
2. Beam tube, 15 ft long
3. Steel shielding and marble headstone

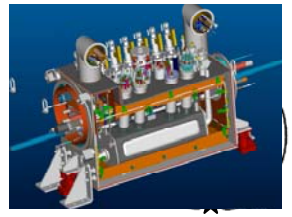
33 Tons total weight

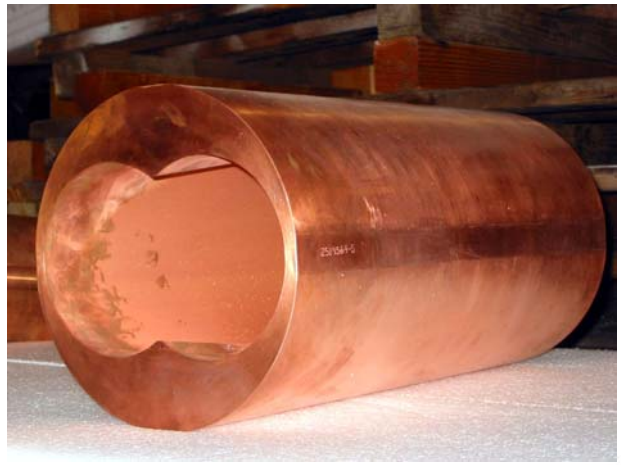
Absorber Box (includes the Beam Tube)

Steel Shielding

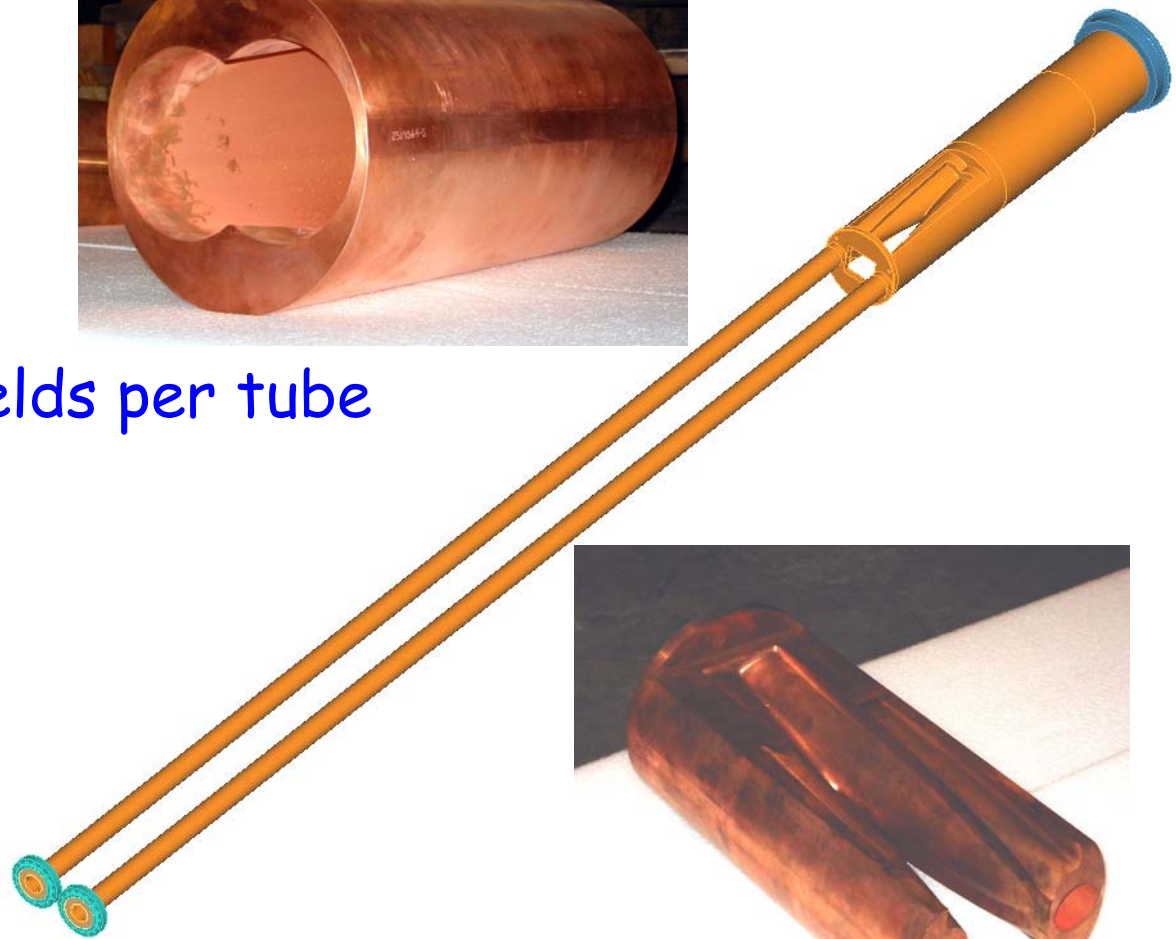
Beam Tube

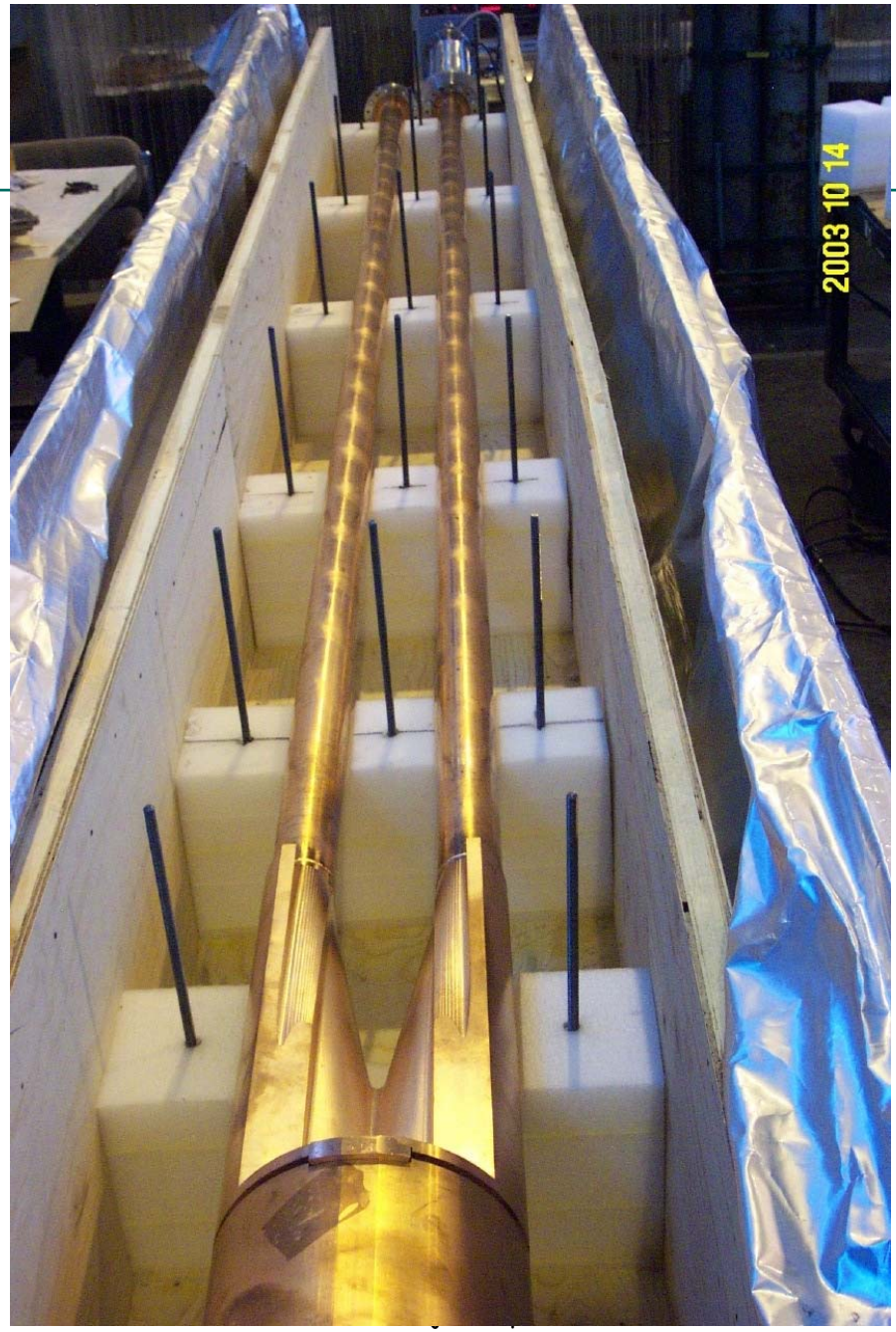
Vacuum Chamber E-Beam Weld at Sciaky in Chicago Land

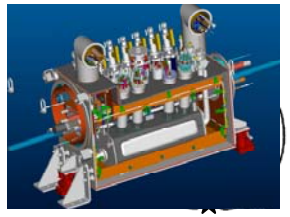




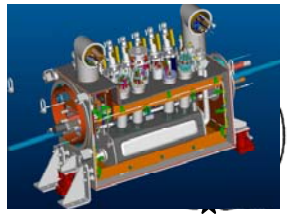
- Total of 9 e-beam welds per tube



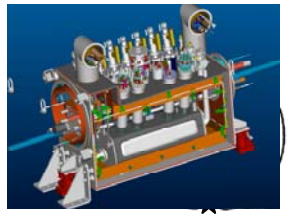

2003 10 14



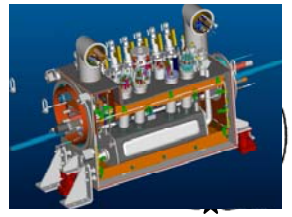
TAN Absorber Fabrication, Assembly and Test are Complete



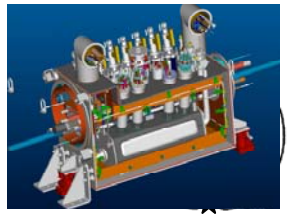
TAN Shield Loaded on Truck, 10 Feb 2004



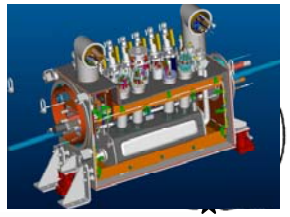
Absorber Boxes Loaded on Truck



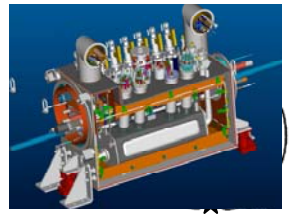
Beam Tubes Loaded on Truck

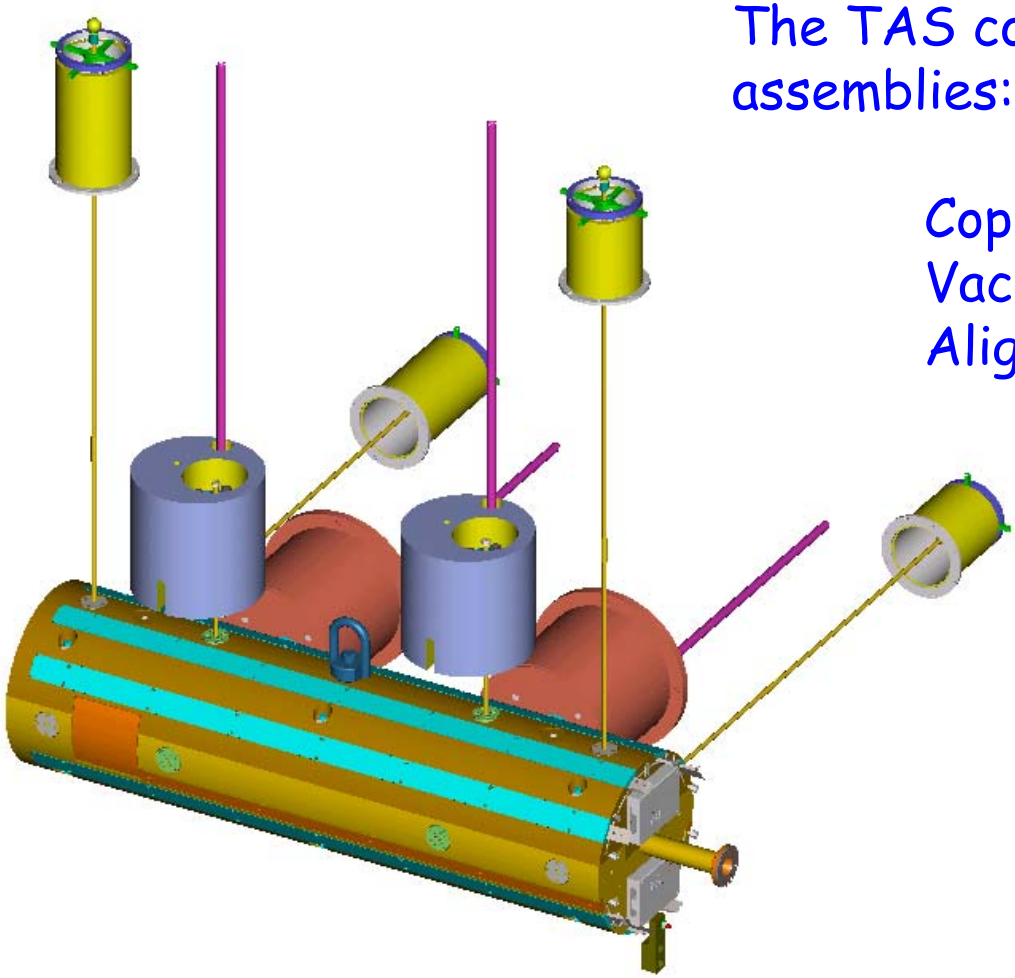


TAN Auxiliary Components



IR ABSORBER OVERVIEW-TAS



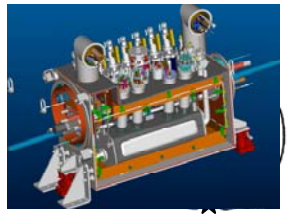


The TAS consists of three major assemblies:

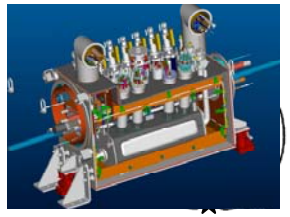
Copper Clamshells
Vacuum Beam Tube
Alignment/support System

Four TAS Assemblies Were complete, Jul 03

Subcontracted Shipping to CERN, Jul 2003



Summary



- Great progress in DFBX fabrication and assembly
- HTS and VC lead fabrication is complete
- Fabrication of LBL furnished material is complete
- DFBX cost is stable, all procurements placed
- Adhering to the fabrication schedule will require careful oversight
- TAS/TAN fabrication and assembly are complete
- TAS arrived at CERN and passed inspection. TAN is in transient
- Project fabrication effort is ramping down but LARP's efforts should be ramping up